PB87-189080

Superfund Record of Decision (EPA Region 4)
Gallaway Ponds Site, Gallaway, Tennessee
September 1986

(U.S.) Environmental Protection Agency
Washington, DC

26 Sep 86

U.S. Department of Commerce
National Technical Information Service
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16. ABSTRACT

The Gallaway Ponds site is located 2.3 miles northeast of Gallaway, Fayette County, TN. The site lies near the top of a low ridge composed mainly of gravel, sand, and clay terrace deposits. The ridge has been extensively mined for sand and gravel, producing a landscape dotted with water-filled pits up to 50 feet deep. The site encompasses the land area adjacent to and including nine ponds located within a currently inactive (5-acre) portion of a larger (50-acre) active sand and gravel operation. One pond, designated Pond 1, was used for the disposal of liquid and solid waste, including pesticides, glass jars containing solid waste, and drums. Some pits have been used for the disposal of residential trash, demolition debris, and appliances. Disposal of hazardous materials at the site occurred for an undetermined period of time, probably in the 1970s or early 1980s. Drums containing liquid waste were disposed of by emptying the drums into a small pond or by placing the entire drum into the pond. Small glass bottles containing "quality control" samples from pesticide blending operations were disposed of directly to the small pond. No disposal activities at this site have ever been permitted by State or local authorities. In October 1983, the EPA conducted an emergency cleanup of Pond 1, consisting of the excavation and offsite disposal of contaminated sludges and the onsite treatment of the water in the pond. The treated water was subsequently discharged to Ponds 2 and 3, located east of Pond 1. The primary
(See Attached Sheet)

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a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Record of Decision Gallaway Ponds, TN Contaminated Media: soils, sediments, sw Key contaminants: pesticides, inorganics, organics		
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EPA

Superfund Record of Decision:

Gallaway Ponds, TN

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16. ABSTRACT (continued)

contaminants of concern include: pesticides, inorganics, chlordane, and toxaphene.

The selected remedial action includes: excavation of contaminated sediments from Ponds 2 and 5 with onsite disposal in Pond 1; proper site closure under Subtitle C of RCRA; dilution of water from Ponds 1,2, and 5 with city water to meet Ambient Water Quality Criteria and subsequent discharge to unnamed tributary; institutional controls which will be fully identified during remedial design; ground water monitoring; inspection and maintenance of the cap. The estimated capital cost is $344,735 with 30-year O&M present worth costs of $163,265.

RECORD OF DECISION
REMEDIAL ALTERNATIVE SELECTION

SITE

Gallaway Ponds site, Gallaway, Tennessee

DOCUMENTS REVIEWED

I am basing my decision primarily on the following documents describing site specific conditions and the analysis of cost-effectiveness of remedial alternatives for the Gallaway Ponds site:

- Gallaway Ponds Remedial Action Master Plan
- Gallaway Ponds Focused Remedial Investigation
- Gallaway Ponds Focused Feasibility Study
- Formal Review by the Agency for Toxic Substances and Disease Registry
- Gallaway Ponds Hazardous Waste Site Clean-up Report
- Staff Recommendations

DESCRIPTION OF THE SELECTED REMEDY

The selected remedy includes:

- Excavation of contaminated sediments from Ponds 2 and 5 with onsite disposal in Pond 1.

- Proper site closure under Subtitle C of RCRA.

- Dilution of water from Ponds 1,2, and 5 with city water to meet Ambient Water Quality Criteria and subsequent discharge to unnamed tributary.

- Institutional controls, which will be fully identified during remedial design, will be implemented. These controls may include, but will not be limited to:

    - fencing the remediated Pond 1 area,
    - instituting a mining restriction on the remediated Pond 1 area,
    - ensuring future land uses compatible with the remedy

- Operation and Maintenance (O&M) activities will include:

    - groundwater monitoring
    - inspection and maintenance of the cap

Additional O&M activities may be identified during the Remedial Design.

DECLARATIONS

Consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), and the National Contingency Plan (40 CFR, Part 300), I have determined that the above Description of the Selected Remedy for the Gallaway Ponds site is a cost-effective remedy and provides adequate protection of public health, welfare, and the environment. The State of Tennessee has been consulted and agrees with the approved remedy.

I have also determined that the action being taken is appropriate when balanced against the availability of Trust Fund Monies for use at other sites.

SEP 26 1986

Date

Jack E. Ravan

Jack E. Ravan
Regional Administrator

RECORD OF DECISION
SUMMARY OF REMEDIAL ALTERNATIVE SELECTION
GALLAWAY PONDS SITE
GALLAWAY, TENNESSEE

SITE LOCATION AND DESCRIPTION

The Gallaway Ponds site is located 2.3 miles northeast of Gallaway, Tennessee, in Fayette County. The site lies near the top of a low ridge composed mainly of gravel, sand, and clay terrace deposits. The ridge has been extensively mined for sand and gravel, producing a landscape dotted with water-filled pits up to 50 feet deep. Some of these pits have been used for the disposal of residential trash, demolition debris, and appliances.

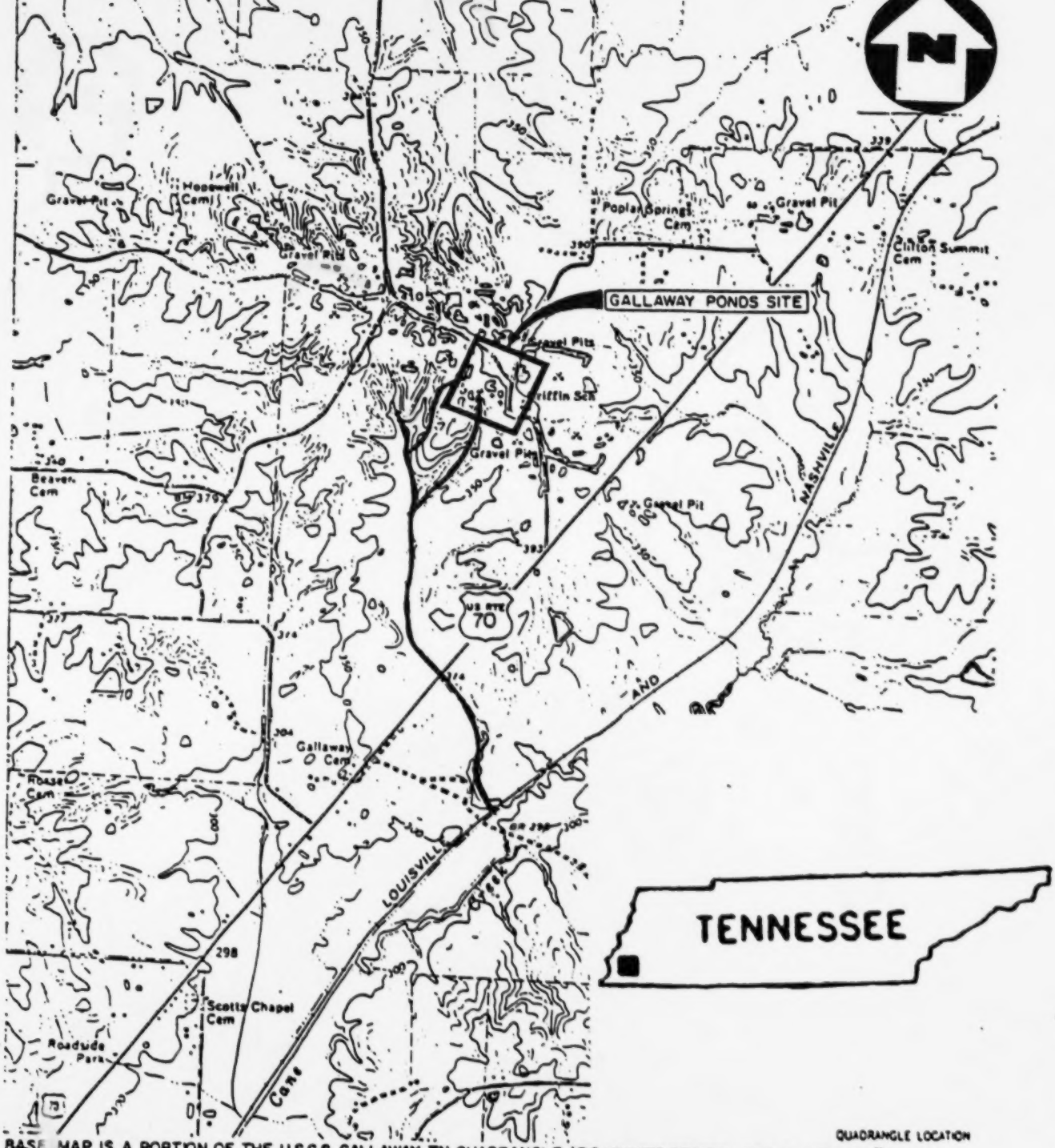
The site as defined by the Remedial Investigation encompasses the land area adjacent to and including nine ponds located within a currently inactive (5 acres) portion of a larger (50 acres) active sand and gravel operation. One pond designated as Pond 1 was used for the disposal of liquid and solid waste (mainly pesticide or pesticide residues), glass jars containing solid waste, and drums (see Figure 1).

Land usage within about one mile of the site is mainly agricultural. Of three properties adjacent to the site, two are now or were recently used for gravel mining operations similar to those carried on at the site. The remainder of the land not used for agricultural or mining purposes is wooded.

The nearest surface water, with the exception of abandoned gravel pits that contain standing water, is an unnamed tributary of Cane Creek. Cane Creek drains southward to the Loosahatchie River. Runoff from the site is largely contained within the property and infiltrates to the water table, rather than discharging to surface waterways (see Figure 2).

The formations significant to the hydrogeology of the site are the Jackson Formation and the overlying water-bearing deposits. The Jackson Formation, which is roughly 90 feet in thickness, is important because it hydraulically separates the water-table aquifer, which produces only small domestic supplies, from the underlying, confined sands of the Claiborne group, which is a major municipal water source (see Figure 3).

Based on available information, the nearest active private water supply wells are located about 1,600 feet west of the site. All of the well logs examined indicated that these wells are screened in the water-bearing sand zone which underlies the Jackson clay. Municipal wells located about 2 miles to the southwest of the site supply water to the town of Gallaway. The church, located adjacent to the site, is supplied with water from the Gallaway municipal water system.



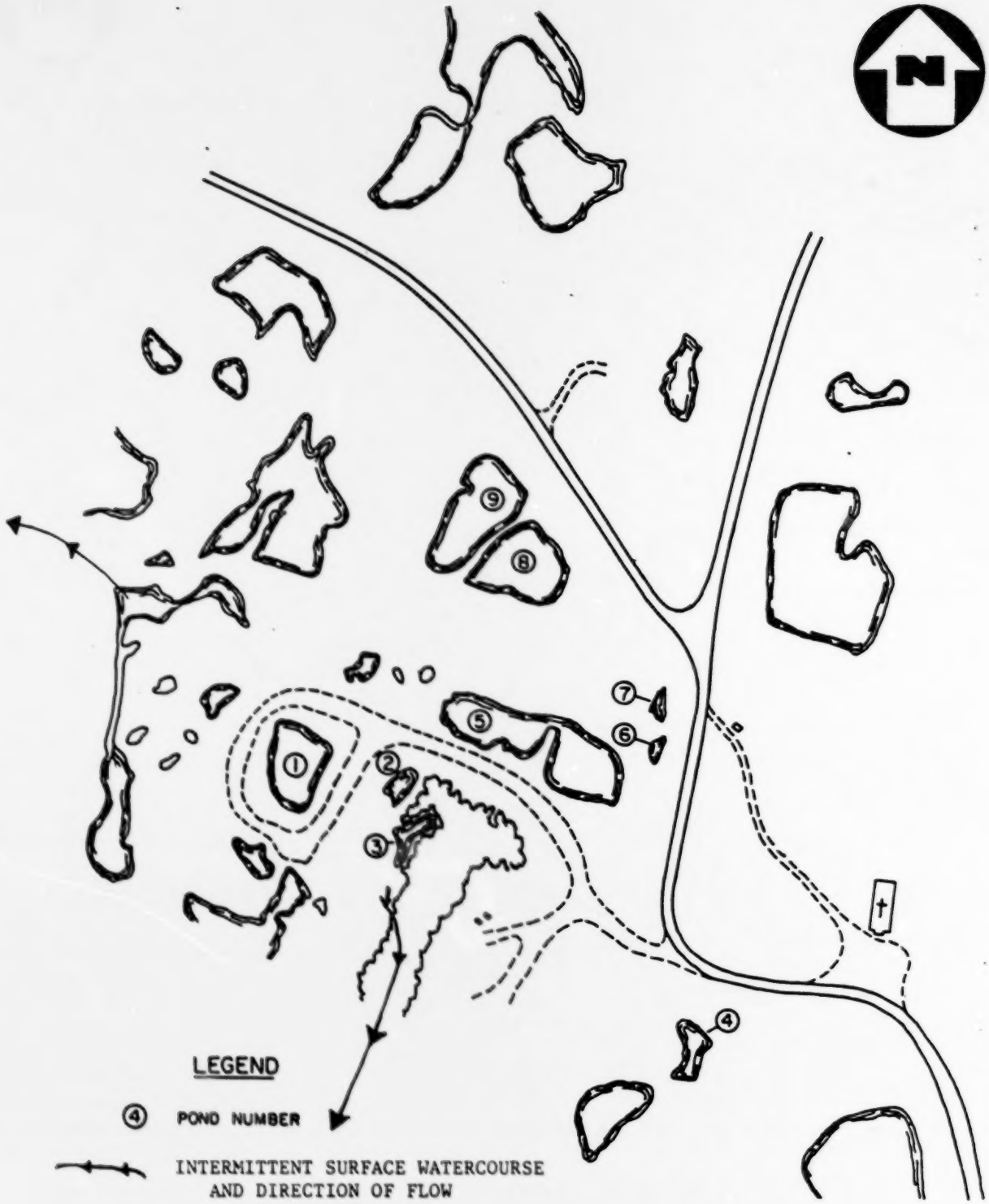
QUADRANGLE LOCATION

BASE MAP IS A PORTION OF THE U.S.G.S. GALLAWAY, TN QUADRANGLE (7.5 MINUTE SERIES, 1965, PHOTOREVISED 1973). CONTOUR INTERVAL 10'.

LOCATION MAP
GALLAWAY PONDS SITE, GALLAWAY, TN

SCALE: 1" = 2000'

FIGURE 2

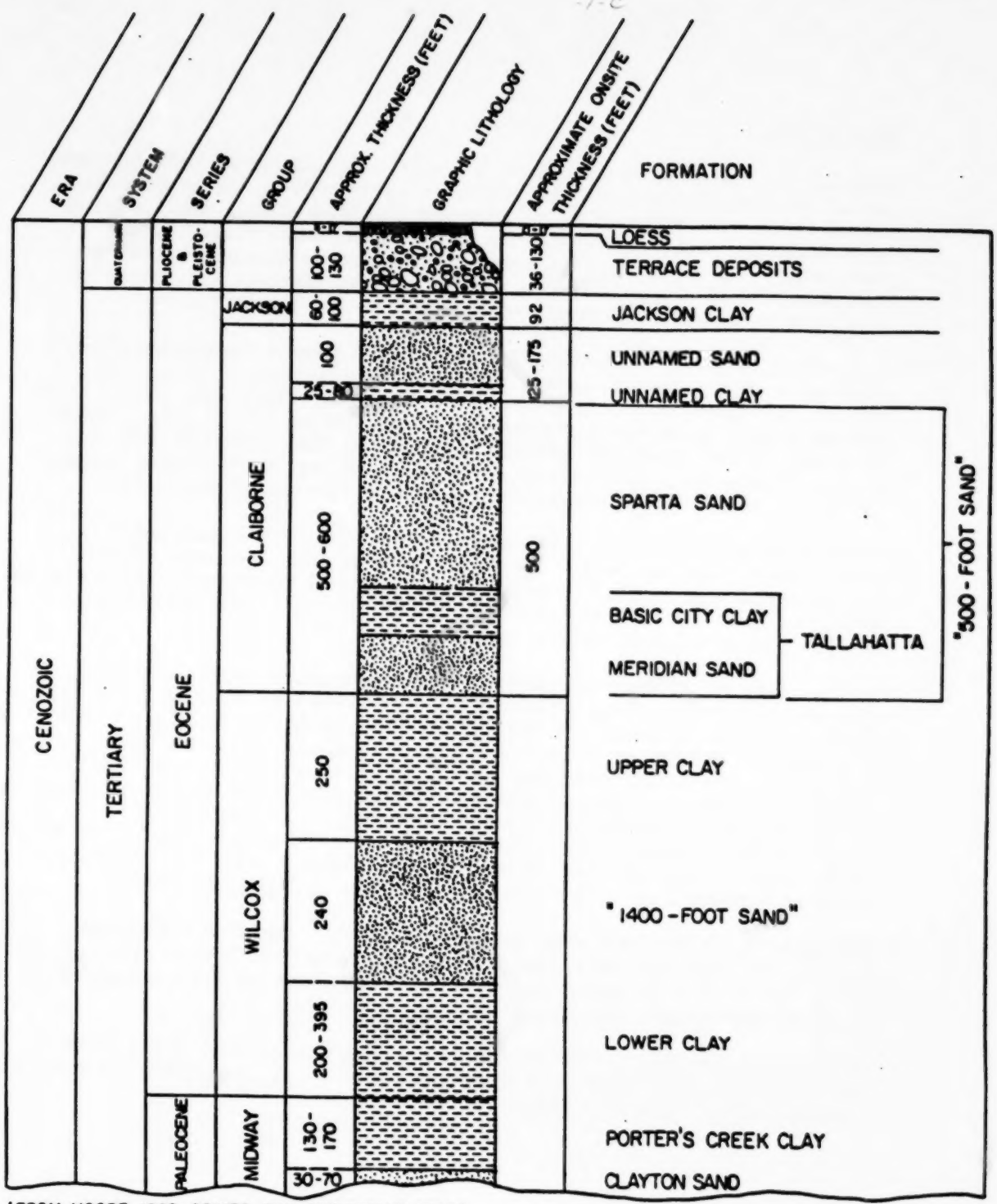


POND LOCATIONS

GALLAWAY PONDS SITE, GALLAWAY, TN

SCALE : 1" = 200'

FIGURE 1



(FROM MOORE, 1965; CRINER, SUN, AND NYMAN, 1968)

FIGURE 3

PARTIAL GEOLOGIC COLUMN, GALLAWAY, TN, AREA
GALLAWAY PONDS SITE, GALLAWAY, TN
NOT TO SCALE

SITE HISTORY

Disposal of hazardous materials at the site occurred for an undetermined period of time, probably in the 1970's or early 1980's. Drums containing liquid waste were disposed of by emptying the drums into a small pond or by placing the entire drum into the pond. Also, small glass bottles containing "quality control" samples from pesticide blending operations were disposed of directly to the small pond. No disposal activities at this site have ever been permitted by State or local authorities.

In January 1982, the Tennessee Division of Solid Waste Management (TDSWM) received a report from a citizen concerning the dumping of drums and smaller containers into a gravel pit near Gallaway, TN. This person also indicated that there was a strong odor of pesticides in the area. TDSWM personnel investigated the incident and noticed that labels on some of the containers made reference to Arlington Blending and Packaging Company (ABPC), a small pesticide blending company located in Arlington, TN.

TDSWM's inspection of the site revealed that some of the containers had been removed from the pond. They later learned that the owner of ABPC had conducted the removal. During this inspection TDSWM personnel collected water and sediment samples from the pit for analysis. The analytical results showed elevated levels of pesticides.

The Gallaway Ponds site was proposed for the National Priorities List (NPL) in December 1982, and was finalized in early 1983 with a MITRE score of 30.77. In October 1983, the EPA conducted an emergency cleanup of Pond 1, consisting of the excavation and offsite disposal of contaminated sludges and the onsite treatment of the water in the pond. The treatment process involved the carbon filtration of the pond water to limits established by the Tennessee Department of Health and Environment (TDHE), Division of Water Quality Control. The treated water was subsequently discharged to Ponds 2 and 3, located east of Pond 1. In February 1984, EPA obligated funds to conduct a Remedial Investigation/Feasibility Study (RI/FS).

NUS Corporation was tasked to perform the RI/FS. Based on extensive discussions with the EPA On-Scene Coordinator for the federal clean-up action and a review of site background data, it was determined that a focused RI would be appropriate for this site.

The Focused Remedial Investigation Report was finalized in April 1986. The draft Focused Feasibility Study was completed in June 1986. The public comment period ended on August 12, 1986.

SITE OWNERSHIP

The site has been used for sand and gravel mining for many years. Mr. Bennie Dove, the former site owner, leased the property for mining operations and had no connection with the waste disposal practices at anytime.

In 1984, Mr. Billy Ray acquired the property. His intended use of the 50-acres was to mine the remaining gravel deposits. He was asked to cease his active mining operations in the site investigation areas to allow for EPA remedial investigation studies. Mr. Ray is currently re-mining gravel deposits in much of the surrounding areas.

CURRENT SITE STATUS

The Focused Remedial Investigation included a sampling program for the following environmental media: surface water and sediment, surface soils and groundwater. The following sections describe the results of this investigation:

ONSITE SURFACE WATER/SEDIMENT (Ponds 1-9)

Contaminants detected in the surface waters of Ponds 1, 2, 5, 8, and 9 exceed the acute Ambient Water Quality Criteria (AWQC) for the following parameters (see Table 1): Pond 1 - chlordane, Pond 2 - toxaphene, Pond 5 - cadmium, Pond 8 - arsenic, and Pond 9 - cadmium.

Chronic AWQC limits are exceeded in Ponds 1, 2, 3, 4, 8, and 9 for pesticides and in Ponds 5, 8, and 9 for inorganics. These contaminant levels are high enough to be harmful to aquatic life and probably preclude the presence of many sensitive species in the ponds.

The sediment in Ponds 1, 2, 3, 4, 8, and 9 showed pesticide contamination. Chlordane is the most prevalent contaminant, with a few occurrences of dieldrin and toxaphene. The sediment in Pond 7 contained cadmium above background levels, while ponds 8 and 9 contained high levels of arsenic.

SURFACE SOILS

Chlordane was detected in the surface soils around the northern half of Pond 1 and between Ponds 1 and 9. Arsenic and cadmium were also detected in the surface soils. Similar levels of arsenic were detected over much of the site, as well as in two background locations, and therefore its presence may not be site-related. Cadmium was detected in a sample located west of Pond 1, which was the same sample that contained the highest chlordane value. Cadmium was also detected in a sample that was located between Ponds 1 and 3 (see Table 2).

GROUNDWATER

No pesticides were detected in the subsurface soil sample located west of Pond 1. Samples were collected at 5-foot intervals from a depth of 5 feet to a depth of 52 feet. As a class, pesticides have low mobility and therefore, are unlikely to migrate to any great depth. Chloroform, a common laboratory solvent, was estimated to be present at very low levels (less than the contract-required detection limit) in the upper 10 feet of the boring. Other volatiles, which were not found elsewhere on site, were found in the deepest subsurface sample at a depth of 51 feet. This sample was collected from within the top of the Jackson clay. Cadmium was also present in this sample. It is possible that the clay has concentrated the volatiles and cadmium from the groundwater, although these contaminants were not detected in any of the groundwater samples.

TABLE 1

POND SAMPLING DATA COMPARED TO AMBIENT WATER QUALITY CRITERIA GALLAWAY PONDS SITE GALLAWAY, TENNESSEE

	Chlordane		Dieldrin		Toxephene		Arsenic		Cadmium*	
	AWQC = 2.4/0.0043 µg/l		AWQC = 25/0.0019 µg/l		AWQC = 16/0.013 µg/l		AWQC = 140/72 µg/l		AWQC(acute) = (0.73) µg/l - Pond 9 (1.6) µg/l - Pond 5	
Pond	Max. Sed. Conc. (ppb)	Max. SW Conc. (ppb)	Max. Sed. Conc. (ppb)	Max. SW Conc. (ppb)	Max. Sed. Conc. (ppb)	Max. SW Conc. (ppb)	Max. Sed. Conc. (ppb)	Max. SW Conc. (ppb)	Max. Sed. Conc. (ppb)	Max. SW Conc. (ppb)
1	31,000	2.6	-	-	-	-	5,200	(14)	-	-
2	500	(0.07)	-	-	2,900	17	5,400	14	-	-
3	990	(0.13)	-	-	-	-	5,400	12	-	-
4	890	(0.12)	-	-	-	-	19,000	(50)	-	-
5	-	-	-	-	-	-	5,000	(13)	-	5.1
6	-	-	-	-	-	-	6,100	18	-	-
7	-	-	-	-	-	-	7,300	(19)	5.5	-
8	-	1.3	1,400	1.4	280	(1.6)	28,000	200	-	-
9	2,200	0.87	-	0.40	-	-	29,000	49	-	5.3

Notes:

AWQC - Ambient Water Quality Criteria (USEPA, October 1980 and USEPA, February 1984) - Acute/Chronic
SW - Surface water
ppb - Parts per billion ($\mu g/l$)
( ) - Calculated value
- - Not detected in media or not calculated
* AWQC for cadmium is based on hardness

TABLE 2

FREQUENCY AND OCCURRENCE OF CHEMICAL PARAMETERS
GALLAWAY PONDS SITE
RESULTS OF THE PHASE 1 - FOCUSED REMEDIAL INVESTIGATION
GALLAWAY, TENNESSEE
(Results Reported in ppb Unless Indicated Otherwise)

	Surface Water			Sediment			Surface Soil		
Chemical Parameter	Range of Detections (Low/High)		No. of Detections/ No. of Samples	Range of Detections (Low/High)		No. of Detections/ No. of Samples	Range of Detections (Low/High)		No. of Detections/ No. of Samples
Monocyclic Aromatics									
ethylbenzene									
toluene									
total xylenes									
Halogenated Aliphatics									
1,1,1-trichloroethane									
methylene chloride	380	430	2/15						
chloroform									
Ketones									
acetone				400	2,300	3/13	--	1,000	1/12
2 butanone									
Polynuclear aromatics									
benzo(a)anthracene				--	70	1/13			
Phthalate Esters									
bis(2-ethylhexyl)phthalate				--	100	1/13			
di-n-octyl phthalate									
Pesticides/PCBs									
chlordane	0.67	2.6	4/15	500	14,000	7/13	46	4,500	3/12
dieldrin	0.40	1.4	2/15	--	280	2/13			
endrin	0.05	0.14	2/15						
endrin ketone	0.11	0.25	2/15						
toxaphene	--	17	1/16	--	2,900	1/13			

TABLE 2

FREQUENCY AND OCCURRENCE OF CHEMICAL PARAMETERS
GALLAWAY PONDS SITE
RESULTS OF THE PHASE 1 - FOCUSED REMEDIAL INVESTIGATION
GALLAWAY, TENNESSEE
(Results Reported in ppb Unless Indicated Otherwise)
PAGE TWO

Chemical Parameter	Surface Water			Sediment			Surface Soil		
	Range of Detections (Low/High)		No. of Detections/ No. of Samples	Range of Detections (Low/High)		No. of Detections/ No. of Samples	Range of Detections (Low/High)		No. of Detections/ No. of Samples
Miscellaneous Compounds									
propanol				--	5	1/13			
benzoic acid				--	400	1/13			
hexandioic acid, dioctyl ester				800	3,000	3/13			
prometryne				--	1,000	1/13			
				(mg/kg)			(mg/kg)		
Inorganics									
aluminum	100	20,000	15/15	5,800	15,000	13/13	6,300	24,000	13/13
arsenic	12	200	6/15	5	29	11/13	2.8	30	12/13
barium	30	250	14/15	55	150	13/13	39	130	12/13
beryllium	0.7	1.8	4/15	0.47	1.1	11/13	0.48	0.98	11/13
cadmium	5.1	5.5	3/15	--	5.5	1/13	3.2	4.2	2/13
calcium	2,700	32,000	15/15	800	5,500	13/13	720	40,000	12/13
chromium	4.8	56	10/15	9.9	28	13/13	10	20	13/13
cobalt	13	15	2/15	6	19	13/13	5.8	13	12/13
copper	5.3	80	13/15	9.2	45	13/13	8.7	27	12/13
iron	100	51,000	15/15	12,000	34,000	13/13	13,000	30,000	13/13
lead	3	38	12/15	7.5	56	13/13	6.2	20	13/13
magnesium	1,500	12,000	15/15	1,200	2,800	13/13	660	3,200	12/13
manganese	12	2,800	15/15	180	1,100	13/13	130	740	13/13
mercury				0.2	0.3	7/13	0.2	0.3	2/13
nickel	8.4	280	10/15	6.7	21	13/13	7.8	21	12/13
potassium	1,400	3,800	14/15	1,000	1,400	4/13	750	1,300	7/13
sodium	2,800	11,000	15/15	900	6,000	9/13	3,000	4,000	10/13
vanadium	5.7	86	9/15	18	44	13/13	21	44	13/13
zinc	20	180	12/15	35	170	13/13	20	84	13/13

TABLE 2

FREQUENCY AND OCCURRENCE OF CHEMICAL PARAMETERS
GALLAWAY PONDS SITE
RESULTS OF THE PHASE 1 - FOCUSED REMEDIAL INVESTIGATION
GALLAWAY, TENNESSEE
(Results Reported in ppb Unless Indicated Otherwise)
PAGE THREE

Chemical Parameter	Subsurface Soil		Groundwater		Residential Wells	
	Range of Detections (Low/High)	No. of Detections/ No. of Samples	Range of Detections (Low/High)	No. of Detections/ No. of Samples	Range of Detections (Low/High)	No. of Detections/ No. of Samples
Monocyclic Aromatics						
ethylbenzene	--	21	1/11			
toluene	--	40	1/11			
total xylenes	--	61	1/11			
Halogenated Aliphatics						
1,1,1-trichloroethane	--	13	1/11			
methylene chloride						
chloroform	3.6	4.2	3/11	3.1 3.6	2/8	
Ketones						
acetone						
2 butanone	--	3.8	1/11			
Polynuclear aromatics						
benzo(a)anthracene						
Phthalate Esters						
bis(2-ethylhexyl)phthalate	230	310	3/11			
di-n-octyl phthalate						
Pesticides/PCBs						
chlordane						
dieldrin						
endrin						
endrin ketone						
toxaphene						

F-4

TABLE 2

FREQUENCY AND OCCURRENCE OF CHEMICAL PARAMETERS
GALLAWAY PONDS SITE
RESULTS OF THE PHASE 1 - FOCUSED REMEDIAL INVESTIGATION
GALLAWAY, TENNESSEE
(Results Reported in ppb Unless Indicated Otherwise)
PAGE FOUR

Chemical Parameter	Subsurface Soil			Groundwater			Residential Wells		
	Range of Detections (Low/High)		No. of Detections/ No. of Samples	Range of Detections (Low/High)		No. of Detections/ No. of Samples	Range of Detections (Low/High)		No. of Detections/ No. of Samples
Miscelleneous Compounds									
propanol									
benzoic acid									
hexandioic acid, dioctyl ester									
prometryne									
	(mg/kg)								
Inorganics									
aluminum	1,200	13,000	11/11	320	1,100	8/8			
arsenic				--	120	1/8	17	180	3/3
barium							--	5.0	1/3
beryllium	--	18	1/11						
cadmium				13,000	41,000	8/8	3,800	8,000	3/3
calcium	10	20	4/11	10	23	4/8			
chromium				28	140	8/8	--	12	1/3
cobalt				900	6,500	8/8	--	5,800	1/3
copper	4,300	19,000	11/11	5.8	7.4	2/8	2	3	2/3
iron	5	17	11/11	3,300	20,000	7/8	1,700	4,600	3/3
lead				52	370	8/8	--	110	1/3
magnesium	10	600	8/11	--	0.2	1/8			
manganese				94	140	7/8			
mercury				3,300	3,800	2/8	--	2,300	1/3
nickel				21,000	82,000	8/8	14,000	20,000	3/3
potassium									
sodium	20	30	4/11						
vanadium	20	140	6/11	15	82	8/8	15	21	2/3
zinc									

Note: Sampling performed by NUS Corporation in January and May 1985.

The groundwater beneath the site currently appears to be free of site-related contaminants and does not appear to present any risk to offsite receptors.

OFFSITE

No site-related contaminants were detected in offsite surface waters. One offsite sediment sample, located in a tributary of Cane Creek south of the site, contained chlordane and dieldrin. The presence of pesticides in this sediment sample may be the result of either erosion of onsite soils or the local agricultural application of pesticides. No site-related contaminants were detected in offsite drinking water.

HYDROGEOLOGY

Ground Water Characteristics. The water-table gradient is fairly flat across the site, although the depth to the water table surface varies with topography. The depth from the ground surface to the water table in the monitoring wells ranged from approximately 25 feet to 45 feet.

Groundwater generally flows from east to west beneath the site. A groundwater divide may exist on site such that groundwater in the northern half of the site tends to flow to the northwest, whereas groundwater in the southern half of the site tends to flow to the southwest. The groundwater flow direction may be controlled to some extent by discharge into the nearby stream headwaters.

TRANSPORT ROUTES

Due to the behavior of these pesticides in soils, they would tend to adsorb to the sediments and remain in-place. Table 3 lists the relative mobilities of several pesticides in soils. The pesticides of interest, chlordane, dieldrin, and toxaphene, are immobile. Aside from the chemical structure of these pesticides, soil properties also influence adsorption. The low permeability of the pond bottoms does not favor infiltration of contaminants into the groundwater. Clay and organic matter content tend to be highly correlated with pesticide adsorption. Soil/sediment adsorption coefficients of the pesticides found on site also indicate that the pesticides are not readily transported in solution to groundwater but tend to adsorb to soil particles.

The tendency of pesticides to leach from soils is inversely related to their potential for adsorption. Strongly adsorbed molecules are not likely to move downward through the soil profile. Therefore, conditions which encourage such adsorption will discourage leaching.

Therefore, if the contaminanted soils were to be transported offsite it, would be via storm water runoff or the wind.

TABLE 3

RELATIVE MOBILITY OF PESTICIDES IN SOILS*

Immobile	Slightly Mobile	Mobile
Aldrin	Atrazine	2,4-D
Chlordane	Simazine	2,4,5-T
DDT	Prometryne	MCPA
Dieldrin	Azinophosmethyl	Picloram
Endrin	Carbophenthion	Fenac
Heptachlor	Diazinon	
Toxaphene	Ethion	
TDE	Methyl parathion	
Lindane ⟷	Lindane	
Heptachlor epoxide ⟷	Heptachlor epoxide	
Trifluralin	Parathion	
	Phorate	
	Diuron	
	Monuron	
	Linuron	
	CIPC	
	IPC	
	EPTC	
	Pebulate	

* Pesticide Disposal and Detoxification - Processes and Techniques, 1981.

RECEPTORS

At the present time, no receptors have been identified at the site. Potential receptors at the site include the following:

- Employees of the gravel company who come into contact with the contaminated soil and pond sediments will be exposed to both a dermal and an inhalation condition.

- Casual intruders who regularly traverse the site will be exposed to contaminated surface soils.

- Local residents who swim in the ponds will experience both very low dermal and (accidental) ingestion exposures to contaminated sediments and surface water. However, the use of the ponds for swimming is expected to be highly infrequent.

- Local residents who may regularly consume fish from the ponds would be at a very low risk; however, present site conditions make this repeated, long-term exposure unlikely because fish are not known to be present in any of the ponds.

- Local residents who may regularly consume fish from the nearby streams which receive sediments or runoff from the site could, through the food chain, be exposed to contaminants that have migrated from the site.

- Offsite biota, in the tributaries that receive runoff of pond water overflow during heavy rainfall, could be adversely affected by site-related contamination.

- Persons using driveways constructed with sand and gravel from the pits, where the sand and gravel has not been covered with asphalt. Because of the tendency of this material to "set up" after a rain, exposures will be very limited.

RISK ASSESSMENT

A quantitative risk assessment was performed for various contaminant exposure pathways. Risks for the exposure pathways were calculated for the site for the conditions of both mining and no-mining. Based on the available data and the risk assessment assumptions, the exposure pathways present no unacceptable risks to human receptors under both the no-mining and mining conditions. The risks for each pathway were all less than 1×10^{-6} to humans. Tables 4 and 5 present summaries of the carcinogenic risks posed by the resumption of mining in the area of the contaminated ponds. The only unacceptable risk presented by the Gallaway Ponds Site is the potential risk to offsite biota that could occur if Ponds 1, 2, and 5 would overflow to offsite tributaries. Table 6 contains ceiling contaminant concentrations (action levels) that could cause biota risks.

TABLE 4

CARCINOGENIC RISKS FROM DERMAL EXPOSURES OF
MINING COMPANY EMPLOYEES
GALLAWAY PONDS SITE
GALLAWAY, TENNESSEE

Activity	Carcinogenic Risk Due to Exposure			Total Risk
	Chlordane	Dieldrin	Toxaphene	
Soil Disturbance				
- Entire Site	2.5×10^{-7}	ND	ND	2.5×10^{-7}
Sediment Disturbance				
- Pond 1	6.8×10^{-7}	ND	ND	6.8×10^{-7}
- Pond 2	1.1×10^{-8}	ND	4.4×10^{-8}	5.5×10^{-8}
- Pond 3	2.2×10^{-8}	ND	ND	2.2×10^{-8}
- Pond 4	2.0×10^{-8}	ND	ND	2.0×10^{-8}
- Pond 5	ND	ND	ND	-
- Pond 6	ND	ND	ND	-
- Pond 7	ND	ND	ND	-
- Pond 8	ND	5.8×10^{-7}	4.2×10^{-9}	5.8×10^{-7}
- Pond 9	4.8×10^{-8}	ND	ND	4.8×10^{-8}
Total Risk				1.6×10^{-6} (1 in 600,000)

Notes: ND - Contaminant was not detected in medium.

TABLE 5

CARCINOGENIC RISKS FROM INHALATIONAL EXPOSURES OF
MINING COMPANY EMPLOYEES
GALLAWAY PONDS SITE
GALLAWAY, TENNESSEE

Activity	Carcinogenic Risk Due to Exposure					Total Risk
	Chlordane	Dieldrin	Toxaphene	Arsenic	Cadmium	
Soil Disturbance						
- Entire Site	1.5×10^{-11}	ND	ND	1.1×10^{-9}	ND	1.1×10^{-9}
Sediment Disturbance						
- Pond 1	3.8×10^{-11}	ND	ND	2.6×10^{-11}	ND	6.4×10^{-11}
- Pond 2	6.0×10^{-13}	ND	2.4×10^{-12}	6.1×10^{-11}	ND	6.4×10^{-11}
- Pond 3	1.2×10^{-12}	ND	ND	6.2×10^{-11}	ND	6.3×10^{-11}
- Pond 4	1.2×10^{-12}	ND	ND	2.2×10^{-10}	ND	2.2×10^{-10}
- Pond 5	ND	ND	ND	5.7×10^{-11}	ND	5.7×10^{-11}
- Pond 6	ND	ND	ND	7.0×10^{-11}	ND	7.0×10^{-11}
- Pond 7	ND	ND	ND	8.4×10^{-11}	1.7×10^{-10}	2.5×10^{-10}
- Pond 8	ND	3.2×10^{-11}	2.4×10^{-13}	3.2×10^{-10}	ND	3.5×10^{-10}
- Pond 9	2.7×10^{-12}	ND	ND	4.0×10^{-10}	ND	4.0×10^{-10}
Total Risk						2.6×10^{-9} (1 in 3.8×10^{8})

Notes: ND - Contaminant was not detected in medium.

TABLE 6

PRESENT AND FUTURE REMEDIAL ACTION LEVELS (FOR SUSPECTED CARCINOGENS)
GALLAWAY PONDS SITE
FOCUSED FEASIBILITY STUDY

Exposure Pathway and Receptor	Present and Future Remedial Action Objectives	Action Levels - (Units are ug/l for water, ug/kg for soil and sediment)			
		Chlordane	Toxaphene	Arsenic	Cadmium
1. Surface Water, Onsite Ponds					
a. Ingestion -- humans (from swiminng)	a. Monitor to ensure that pond water contaminant levels are below 1×10^{-4} risk level for swimmers, if this activity occurs.	16,000 ug/l	4,100 ug/l	1,700 ug/l	3,300 ug/l
b. Dermal -- humans (from swimming)	b. Same as a. for pond sediment diffusion into water.	450,000 ug/l	660,000 ug/l	NA	NA
2. Surface Water Offsite Tributaries					
a. Biota	a. Reduce surface water contaminant levels in Ponds 1, 2, and 5 to acute AWQC plus monitor 3, 4, 6, and 7, and compare values to acute AWQC to detect potential risk to offsite biota.	2.4 ug/l	1.6 ug/l	140 ug/l	Pond 1 - 3.9 ug/l* Pond 2 - 1.1 ug/l Pond 3 - 1.2 ug/l Pond 4 - 0.94 ug/l Pond 5 - 1.6 ug/l Pond 6 - 2.6 ug/l Pond 7 - 0.92 ug/l
	Monitor remaining pond sediments and compare to levels that can diffuse to water above acute AWQC.				
	Monitor offsite tributary water and compare to chronic AWQC values to detect risk to biota.	0.0043 ug/l	0.013 ug/l	72 ug/l	0.3 ug/l

TABLE 6

PRESENT AND FUTURE REMEDIAL ACTION LEVELS (FOR SUSPECTED CARCINOGENS)
GALLAWAY PONDS SITE
FOCUSED FEASIBILITY STUDY
PAGE TWO

Exposure Pathway and Receptor	Present and Future Remedial Action Objectives	Action Levels - (Units are ug/l for water, ug/kg for soil and sediment)				
		Chlordane	Toxaphene	Arsenic	Cadmium	Dieldrin
3. Sediments Onsite Ponds						
a. Dermal -- swimmers	a. Monitor pond sediments to ensure levels are below 1×10^{-4} risk if this activity occurs.	8.2×10^{6} ug/kg	1.2×10^{7} ug/kg	NA	NA	
b. Dermal -- miners	b. Monitor pond sediments to ensure levels are below 1×10^{-4} risk if this activity occurs.	7.3×10^{6} ug/kg	6.6×10^{6} ug/kg	NA	NA	
4. Sediments Offsite Tributaries						
a. Offsite biota	a. Monitor tributary sediments to ensure levels will not diffuse into water to levels above chronic AWQC to protect biota.	44,000 ug/kg	170,000 ug/kg	NS	NS	230,000 ug/kg
b. Dermal -- humans	b. Monitor tributary sediments to ensure that levels are below 1×10^{-4} risk for these receptors.	5,800 ug/kg	8,600 ug/kg	NS	NS	300 ug/kg

TABLE 6

PRESENT AND FUTURE REMEDIAL ACTION LEVELS (FOR SUSPECTED CARCINOGENS)
GALLAWAY PONDS SITE
FOCUSED FEASIBILITY STUDY
PAGE THREE

Exposure Pathway and Receptor	Present and Future Remedial Action Objectives	Action Levels - (Units are ug/l for water, ug/kg for soil and sediment)				
		Chlordane	Toxaphene	Arsenic	Cadmium	Dieldrin
5. Soils - Onsite						
a. Dermal - miners	a. Monitor soils to ensure average site soil contaminant levels are below 1×10^{-4} dermal risk level to miners.	300,000 ug/kg	440,000 ug/kg	NA	NA	
b. Dermal - casual intruders	b. Same as a. for casual intruders.	100,000 ug/kg	150,000 ug/kg	NA	NA	
6. Air (Airborne soil/ sediment particulates)						
a. Inhalation of particulates -- miners	a. Compare average site soil monitoring data and average pond sediment data to calculated soil/ sediment values that can create $>10^{-4}$ inhalation risk.	Pure	Pure	Pure	Pure	
b. Inhalation of particulates -- casual intruders	b. Compare average site soil monitoring data to calculated soil values that can create a $>10^{-4}$ inhalation risk.	Pure	Pure	Pure	Pure	

TABLE 6

PRESENT AND FUTURE REMEDIAL ACTION LEVELS (FOR SUSPECTED CARCINOGENS)
GALLAWAY PONDS SITE
FOCUSED FEASIBILITY STUDY
PAGE FOUR

Exposure Pathway and Receptor	Present and Future Remedial Action Objectives	Action Levels - (Units are ug/l for water, ug/kg for soil and sediment)				
		Chlordane	Toxaphene	Arsenic	Cadmium	Dieldrin
7. Biota -- Offsite Tributaries						
a. Ingestion -- humans	a. If fish are consumed from offsite tributaries, then predicted fish tissue concentrations should be estimated from tributary water and sediment sampling results in order to ensure a $<10^{-4}$ risk to persons eating fish.	0.018 ug/l--water 2.9×10^{6} ug/kg--sediment	0.037 ug/l water 490,000 ug/kg--sediment	120 ug/l--water NS--sediment	NB ug/l--water NB--sediment	0.006--water 830,000--sediment

Notes:

NA = Cadmium and arsenic not absorbed dermally
NB = Does not bioconcentrate
NS = No solubility data available for arsenic
* = AWQC for cadmium, based on water hardness
Pure = Contaminant concentration has to be nearly pure for 10^{-4} risk

HEALTH ASSESSMENT

As part of the remedial process, the Agency for Toxic Substances and Disease Registry (ATSDR) was asked to review the site data and provide comments on the health risk posed by the site as well as the remedial alternatives under consideration. Their report dated June 16, 1986 concurred with the findings of the focused RI in that the potential human health exposure threats from the contaminants onsite appear negligible.

ENFORCEMENT ANALYSIS

On September 5, 1985 EPA sent combined notice and demand letters to approximately twelve (12) potentially responsible parties (PRPs), including William Bell the owner/operator of the Arlington Blending and Packaging Company. The letters informed the PRPs of the Agency's belief that they were potentially liable for the costs associated with cleanup activities at the site, included calculations of the cleanup costs and allowed fifteen (15) days in which PRPs could respond to the Agency's demand for reimbursement of those costs. The letter also encouraged the PRPs to organize in order to facilitate discussions with EPA concerning payment.

The PRPs formed a steering committee, ostensibly, for the purpose of obtaining and reviewing the government's evidentiary materials and the PRPs expressed their desire to cooperate with EPA in determining their respective liability, if any. However, to date the PRPs have not come forward with a settlement offer either individually or collectively.

Based on the PRPs obvious absence of willingness to reach a negotiated settlement, the case was referred to the United States Department of Justice (DOJ) on November 8, 1985. Subsequently, on January 7, 1986, information request letters were sent to the PRPs in order to obtain additional information.

INITIAL SCREENING OF REMEDIAL TECHNOLOGIES

Section 300.68 (g) of the NCP requires that alternatives developed in this section be subjected to an initial screening to narrow the list of potential remedial actions for further detailed analysis. Criteria used in the initial screening of alternatives are public health, environmental, cost, technical and institutional considerations.

POND WATER REMEDIATION

Remedial responses developed for the site include processes which would be most applicable for hazardous waste site remediation. Rarely will only one treatment process be sufficient for aqueous waste. Therefore, this section will include information on unit treatment processes which are frequently used in combination and any pre-treatment requirements which are a prerequisite to effective use of each treatment process. Processes which were examined but proved not to be applicable to the site are land treatment, biological treatment, adsorption by oil-absorbing media, chemical oxidation, chemical dechlorination, chemical reduction, liquid-liquid extraction, oil-water separation, steam stripping, air stripping, and ultraviolent/ozonation. The unit treatment processes considered for the site are activated carbon, precipitation and sedimentation, filtration, equalization, ion exchange, reverse osmosis, blending onsite pond water, and dilution with public water.

SCREENING EVALUATION

Activated carbon is a well-developed technology which is widely used in the treatment of hazardous waste streams. It is especially well suited for removal of mixed organics from aqueous wastes. However, it is not applicable for the removal of cadimum and iron. Therefore, since equalizing (mixing) the water from from ponds 1, 2, and 5 would provide the same environmental benefits (i.e. reduction of the likelihood of present or future threat from hazardous substances), this technology was eliminated from further consideration.

Precipitation and sedimentation would be applicable for iron removal, but would probably be ineffective for cadmium removal. The efficiency of cadmium removal solely on a solubility basis is dependent upon the pH level. The theoretical minimum solubility of cadmium hydroxide is higher than the AWQC limit for cadmium discharge. Therefore, precipitation and sedimentation will be eliminated from further consideration.

Dilution involves pumping pond water to an equalization basin and adding clean water until all AWQC levels are met. The diluted pond water would then be suitable for pumping (discharge) to the local surface water. Any sediment that accumulated in the equalization basin would be handled, along with the sediment in ponds 1, 2, and 5. No other residuals would be generated by using this technique. This technique will be retained for further evaluation.

Unit treatment processes for treating the pond water to AWQC levels would be filtration, equalization, and either ion exchange or reverse osmosis. Filtration is applicable at the site if it is neccessary to remove suspended solids prior from any aqueous waste stream that may be generated during the remedial action at the site.

The primary objective of equalization is to dampen flow and concentration fluctuations. Most treatment processes operate more effectively if wastewater composition and flow rate are fairly constant. Equalization basins and tanks can dramatically increase the stability of treatment processes that are sensitive to fluctuating contaminant concentrations.

In this case, sediment that accumulated in the equalization basin would be removed and handled with the sediment from Ponds 1, 2, and 5. There are no other environmental impacts associated with equalization. The only disadvantage is that an equalization basin, when used to dampen fluctuations in the flow rate, may require a considerable amount of land area.

Ion exchange is an aqueous phase process. The dilute, purified stream would be suitable for discharge. However, the concentrated regenerant stream would require proper disposal. This regenerant stream could potentially have high concentrations of the substances removed from the pond water. The regenerant waste could be recycled, but ultimately it would be disposed as a hazardous waste. The regenerant waste stream could be as much as 2.5 percent to 5 percent of the wastewater volume, depending on the volume that could be recycled.

Reverse osmosis, as with ion exchange, results in a dilute, clean stream and a concentrated stream. The concentrate, which contains the substances removed from the wastewater, would require proper disposal. A portion of the concentrate could be recycled, but ultimately it would be disposed as a hazardous waste. The concentrate waste stream could be as much as 15 percent to 30 percent of the wastewater volume, depending on the volume that could be recycled.

Since dilution of the pond water to meet AWQC would provide the same level of environmental protection as treating the water using ion exchange or reverse osmosis, both ion exchange and reverse osmosis will be eliminated on the basis of cost.

The only feasible offsite treatment measure is treatment at a Publicly Owned Treatment Works (POTW). The transport of contaminated pond water for treatment should have no adverse impacts on the environment, public health or welfare, providing there is no spill during transport. Any residuals generated from treatment of pond water at the POTW would be the responsibility of the POTW. The POTW will not accept wastes that would interfere with plant operations, including use and disposal of sludge, or cause the NPDES limits for the POTW to be exceeded.

POND SEDIMENT TREATMENT

Treatment technologies identified for sediments from Ponds 1, 2, and 5 are solidification/fixation, biological degradation, and dewatering. Successful treatment methods would result in remediation of the same contaminant pathways addressed by excavation. Treatment technologies are described below:

- Solidification/Fixation (S/F)

  For an S/F process to be effective, it must stabilize the wastes into a configuration which prevents physical migration and leaching of the waste constituents of concern in the sediment (in this case, metals and pesticides). The S/F process reagents or energy requirements must also be of relatively low cost, since material handling costs for excavation, mixing with reagents, and redeposition are relatively high. In addition, if the S/F process does not meet the leaching criterion, the treated wastes must still be placed in a approved RCRA disposal unit. Thus, additional costs associated with reagents, solids handling, solids mixing, and waste volume increase, in this case, would be unnecessary and substantial. Overall, none of the waste S/F processes appears to meet the solidification, nonleachability, and long-term effectiveness requirements for proper application as a process. The solidification/ fixation technologies will not be considered for use in any remedial alternatives at the Gallaway Ponds site.

- Biological Degradation

  This technology involves the biological seeding of wastes with acclimated or mutant bacteria that will hasten natural biodegradation. There is very limited data on the use of this technology to degrade pesticides. Also, the process will not remove metals; therefore, it is eliminated from further consideration at the Gallaway Ponds site.

- Dewatering

  Municipal Treatment Plant sludge is commonly dewatered using mechanical equipment, such as a vacuum filter, plate and frame filter press, belt filter press, or centrifuge. The pond sediment at the Gallaway Ponds site may contain debris such as refuse, rusted drum pieces, sticks, logs, plant material, etc. The sediment would be difficult to pump under these conditions. Also, the debris would have to be removed prior to application to the dewatering equipment. Because of these constraints, mechanical sediment dewatering is eliminated from further consideration.

  Air drying beds can be used to dewater sediment by both natural drainage and by evaporation from the surface exposed to air. This dewatering method will not require the removal of debris in the sediment prior to dewatering. However, due to the technical uncertainties in the effectiveness of air drying methods, dewatering is not considered for further evaluation at this time.

RECOMMENDED PROCEDURES FOR THE DISPOSAL OF SELECTED PESTICIDES

Land burial or ground surface disposal are the only other options suitable for the disposal of small quantities of these pesticides.

SEDIMENT DISPOSAL

Options considered for the pond sediments include disposal in an offsite RCRA landfill, an onsite RCRA landfill and the designated Pond #1 area. These options are described in the following section:

- Offsite Landfill

  The offsite disposal of sediments is assumed to be at a hazardous waste management facility (HWMF) permitted in accordance with applicable EPA or state regulations based on the Resource Conservation and Recovery Act (RCRA).

  The offsite disposal technology meets all of the criteria for screening: implementability, technical development, and applicability for site conditions. This technology is considered appropriate for removal action and will be included in the development of alternatives.

- Onsite Landfill

  Onsite disposal of contaminated sediments for Ponds 1, 2, and 5 would be performed after the pond water has been removed. All of these materials are considered hazardous in accordance with Tennessee Department of Health & Environment (TDHE) Hazardous Waste Management Rules, Sec. 1200-1-11.

  Landfill design will be in accordance with TDHE rules for hazardous waste landfills, Sec. 1200-1-11-.06.

  Onsite landfilling of sediments is considered an appropriate technology for remediation of the contaminated sediments, and it will be retained for further evaluation.

- Centralization of Waste with Onsite Disposal in Pond 1

  For this disposal option, sediments from Ponds 2 and 5 will be backfilled into Pond 1. The sediment removal and disposal operations will occur after the pond waters have been pumped out.

BACKFILL & REGRADE

Backfilling and regrading of Ponds 1,2, and 5 has been identified as a potential technology for remediation of the future risk associated with overflow of pond water into the unnamed tributary of Cane Creek. Backfilling and regrading is applicable only where pond sediments can be left in place without threat of future disturbance by mining.

Conventional earth-moving equipment, such as bulldozers and scraper pans are expected to accomplish the site grading work. Regrading and backfilling are considered appropriate technologies and will be included for development of remedial alternatives.

ALTERNATIVES EVALUATION

The Feasibility Study developed a range of alternatives that would mitigate any unacceptable risks to receptors posed by seven of the onsite ponds (Ponds 1-7) and the areas of known surficial soil contamination based on data presented in the Remedial Investigation. Ponds 8 and 9 were not addressed for remediation because (1) due to site topography, they would not overflow and (2) sediments would not be disturbed since institutional controls would be implemented to control mining. The only transport pathway would be addressed in the groundwater monitoring program.

As discussed above, the only unacceptable risk presented by the Gallaway Ponds Site is the potential risk to offsite biota that would occur if ponds 1, 2, or 5 were to overflow to offsite tributaries, since these ponds exceed the acute Ambient Water Quality Criteria (AWQC). This assumes a worst-case situation, since the tributaries are intermittent, and probably contain few biota receptors. The remedial objectives and cleanup criteria for this pathway are based on the acute AWQC levels for pond water contaminants. The general objectives are to eliminate the contaminated pond waters which exceed the acute AWQC, and to ensure that the remaining pond sediments do not contaminate future surface waters by contaminant diffusion.

The following seven remedial action responses were developed for a detailed analysis of public health, environmental, and institutional considerations and cost effectiveness:

1. No Action - Since there is no evidence that contaminants are present at the site at levels representing a significant threat to public health or the environment, the "No Action" Alternative will be considered as a feasible response.

2. Backfill/Regrade Ponds 1, 2, 5 - This action would eliminate ponds 1, 2 and 5 by removing the water and backfilling the ponds. This action would result in a final graded site area without depressions or catchments that could pond rainwater.

3. Excavation of sediments from Ponds 2, 5 with onsite disposal in Pond 1 - Sediment removal from Ponds 2 and 5 would prevent the future potential of contaminant diffusion into ponded water, which could occur following mining if these sediments were left on site. Once drained, Pond 1 would then be backfilled with clean fill and regraded to prevent reponding of water, which could become contaminated through sediment diffusion.

4. Offsite Disposal of Pond 1, 2, 5 sediments in a RCRA Landfill- Sediment removal would prevent the distribution of sediments over a larger area that could result in contamination of runoff and surface waters by transport and diffusion of contaminants in sediments if mining resumed.

5. Disposal of Pond 1, 2, 5 sediments in an Onsite RCRA Landfill- An onsite hazardous waste landfill for pond sediments will effectively reduce to an acceptable level the future potential environmental risks to biota. Excavation of the contaminated sediments from Ponds 1, 2, and 5 would be required, at a minimum, and sediments would be disposed of in an onsite landfill. Removal of the contaminated sediments from Ponds 1, 2, and 5 would prevent any leaching or transport of the sediments and would prevent the onsite pond water contamination that causes a potential risk to biota if discharge to onsite tributaries occurs.

6. Monitoring - Monitoring would be used at various stages of the site remediation process to ensure the effectiveness of the remedial technologies and alternatives.

7. Pond Water Treatment - For each alternative that includes pond water treatment, three different treatment options have been identified. These are pumping and disposal at a POTW, dilution with city water or onsite treatment to meet all AWQCs, and blending of onsite ponds to meet organic AWQCs.

The alternatives were assessed relative to the following considerations:

- Appropriate treatment and disposal technologies.
- Special engineering considerations.
- Environmental impacts and proposed methods for mitigating any adverse effects.
- Operation, maintenance, and monitoring requirements.
- Offsite disposal needs and transportation plans.
- Temporary storage requirements.
- Safety requirements for remedial implementation.

The following alternatives which are presented in Table 7 will be evaluated to determine the effectiveness of each alternative to meet these critical components:

No Action

No Action will not require the implementation of any remedial cleanup, investigation, or monitoring actions. Technical and cost evaluations will not be performed.

An unacceptable risk to offsite biota would exist under the No-Action alternative if surface water run-off exceeding the AWQC intercepted the tributaries. The calculated risks to humans for all exposures pathways evaluated were less than 10^{-6} and are therefore acceptable.

No Action with Monitoring

No remedial action will be performed; however, a monitoring program would be implemented. This alternative includes installation of an offset well cluster downgradient of Pond 1 and another cluster downgradient of Ponds 8 and 9. The monitoring program would consist of sampling groundwater onsite and offsite. Table 8 summarizes the groundwater monitoring well programs for the first year for each of the remedial alternatives.

The risk identified in the NO-ACTION Alternative would also exist under this alternative. However, the groundwater monitoring program would be implemented as a precautionary measure to address the possibility of unexpected offsite migration of hazardous substances.

Backfill and Regrade

After the water is removed from Ponds 1, 2, and 5, the ponds would be backfilled with local soils to cover the in-place sediments. The area adjacent to and between the ponds will be regraded and vegetated to promote surface water run off and to minimize ponding and infiltration. A minimum of 4 feet of backfill would be placed over the surface of the pond sediments. Approximately 15,000 cubic yards of fill would be required to backfill the ponds and to construct the graded fill. Conventional earthmoving equipment, such as scraper pans and dozers, would be appropriate for the site work. The grading plan would be designed to approximately balance cut and fill so that local soils would be used for the regraded area. Approximately 4 acres would be regraded. The equalization basin used for the pond-water batch mixing will be used as a sedimentation basin for the regraded area. The sedimentation basin would collect all storm water runoff from the regraded area and would remove sediments transported from the surface. The basin discharge would be the unnamed tributary of Cane Creek. Once the site vegetative cover has fully developed, the sedimentation basin may be removed (see Figure 4).

Another closure method would be to cap Ponds 1, 2, and 5 in-place in accordance with RCRA requirements.

O&M activities would include groundwater sampling and inspection and maintenance of the sedimentation basin, vegetative cover or cap.

TABLE 8

PROPOSED GROUNDWATER MONITORING WELL PROGRAMS
FOR THE VARIOUS REMEDIAL ALTERNATIVES
GALLAWAY PONDS SITE - FOCUSED FEASIBILITY STUDY

Remedial Alternative	Existing wells	New Wells	Comments
No Action			No Monitoring
No Action with Monitoring	6	4 Offset	Install an offset well cluster downgradient of Pond 1 and another downgradient of Ponds 8 and 9 (each cluster consists of two wells - shallow (35') and deep (60')
Backfill/Regrade Ponds 1, 2, 5	6	4 Offset	Install offset well clusters downgradient of Pond 1 and Ponds 8 and 9.
Excavate Ponds 2, 5 Sediment with Onsite Disposal in Pond 1 and Backfill/Regrade Pond 1	6	4 Offset	Install two offset downgradient of Ponds 8 and 9 and two offset downgradient of Pond 1.
Excavate Ponds 2, 5 Sediment with Onsite Disposal in Pond 1 and Cover Pond 1 with Multimedia Cap.	6	4 Offset	Install two offset downgradient of Ponds 8 and 9 and two offset downgradient of Pond 1.
Take Ponds 1, 2, 5, Sediments to Offsite RCRA Landfill	6	2 Offset	Install offset well cluster downgradient of Ponds 8 and 9.
Excavate Ponds 1, 2, 5 Sediment with Disposal in Onsite RCRA Landfill	1	3 RCRA landfill wells 2 offset	Utilize existing MW-2 for upgradient monitoring of onsite landfill. Install three new wells downgradient of landfill Install offset well cluster downgradient of Ponds 8 and 9.

NOTE: DOMESTIC WELL SAMPLING IS INCLUDED IN ALL ALTERNATIVES EXCEPT

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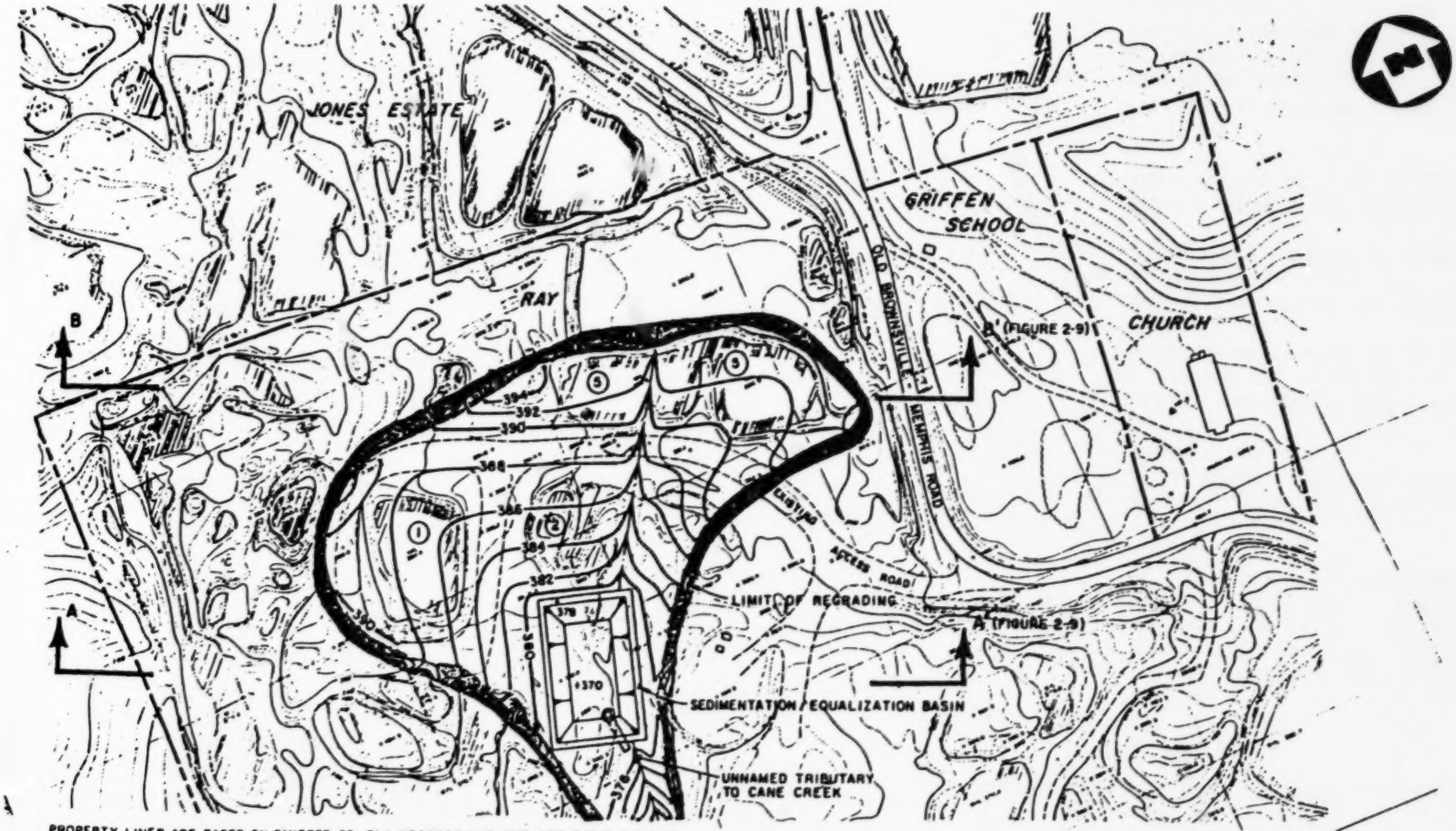

FIGURE 4

BACKFILL AND REGRADING OF PONDS 1, 2, & 5
GALLAWAY PONDS SITE, GALLAWAY, TN

TABLE 7

REMEDIAL ACTION ALTERNATIVES
CAPITAL AND PRESENT-WORTH COSTS SUMMARY
GALLAWAY PONDS SITE

REMEDIAL ALTERNATIVE	COSTS CAPITAL	COSTS PRESENT-WORTH * (30 year O&M)
No Action	$0	$0
No Action with Monitoring	25,000	141,000
Backfill/Regrade Ponds 1,2,5 following:		
a. 1,2,5 water to POTW	364,464	537,000
b. Dilute 1,2,5 H_2O with city H_2O and discharge to tributary to meet AWQC	317,889	491,000
c. Blend 1,2,5 H_2O and discharge to tributary to meet pesticide AWQC	284,398	457,000
Backfill/Regrade and cover Ponds 1, 2, 5 with Multi-media cap (RCRA cap)		
a. 1,2,5 water to POTW	453,243	629,000
b. Dilute 1,2,5 H_2O with city water and discharge to tributary to meet pesticide AWQC.	406,668	580,000
c. Blend 1,2,5 water and discharge to tributary to meet pesticide AWQC.	373,177	546,000
Excavate sediments from Ponds 2,5 with onsite disposal in Pond 1; backfill/regrade Pond 1		
a. 1,2,5 water to POTW	300,371	464,000
b. Dilute 1,2,5 H_2O with city H_2O and discharge to tributary to meet AWQC	243,767	407,000
c. Blend 1,2,5 H_2O and discharge to tributary to meet pesticide AWQC	220,304	384,000
Excavate sediments from Ponds 2,5 with onsite disposal in Pond 1 and cover Pond 1 with multi-media cap (RCRA cap)		
a. 1,2,5 water to POTW	401,339	565,000
b. Dilute 1,2,5 H_2O with city H_2O and discharge to tributary to meet AWQC	344,735	508,000
c. Blend 1,2,5 H_2O and discharge to tributary to meet pesticide AWQC	321,272	485,000

TABLE 7

Take Ponds 1,2,5 sediments to offsite RCRA landfill		
a. 1,2,5 water to POTW	955,296	1,072,000
b. Dilute 1,2,5 H_2O with city H_2O and discharge to tributary to meet AWQC	908,720	1,025,000
c. Blend 1,2,5 H_2O and discharge to tributary to meet pesticide AWQC	875,229	992,000
Excavate Pond 1,2,5 sediments with disposal in onsite RCRA landfill		
a. 1,2,5 water to POTW	1,084,673	1,220,000
b. Dilute 1,2,5 H_2O with city H_2O and discharge to tributary to meet AWQC	1,038,097	1,173,000
c. Blend 1,2,5 H_2O and discharge to tributary to meet pesticide AWQC	1,004,606	1,149,000

* THESE COSTS REFLECT QUARTERLY SAMPLING FOR 0-2 YEARS AND ANNUAL SAMPLING 3-30 YEARS

CENTRALIZATION OF WASTE WITH ONSITE DISPOSAL IN POND 1

For this disposal option, sediments from Ponds 2 and 5 will be backfilled into Pond 1. The sediment removal and disposal operations will occur after the pond waters have been removed. An estimated 1,600 cubic yards of raw, undried sediment will be backfilled into Pond 1. Figure 5 shows the Pond 1 sediment disposal plan.

Pond 1 has an available disposal capacity of approximately 3,500 cubic yards, based on an estimated bottom elevation of 380 feet above mean sea level (AMSL) and berm elevation of 388 feet AMSL. The disposal capacity of Pond 1 can be easily increased by construction of a perimeter berm; however, this is not expected to be necessary.

The extra storage capacity of 1,900 cubic yards (3,500 minus 1,600) will be used for backfill soils to stabilize the "wet" sediments and allow final covering. Backfill of 1,900 cubic yards of "dry" onsite soils into 1,600 cubic yards of "wet" sediments will result in approximately 3,500 cubic yards of mixed soil/sediment.

It is anticipated that after Pond 1 is backfilled with raw, wet sediments, settling will occur and a liquid supernatant layer will be formed. This liquid will be removed as required, and will be treated with the same method used for the pond water. This will result in an increase in sediment solids content with a corresponding increase in extra storage capacity above the estimated 1,900 cubic yards. This benefit from additional settling should be realized if Pond 1 is permitted to be undisturbed for at least one full, dry-weather day. The exact amount of increase in storage capacity is not determinable; however, the increased volume might be needed to allow for more backfill material if the actual sediment moisture contents and disposal quantities are significantly greater than estimated in the FS.

For one closure method, the backfilled Pond 1 will be covered with a local soil cover sloping away from the pond center. A 6-inch topsoil layer will be placed on the sloped soil cover and will be vegetated to minimize future erosion and rainfall percolation.

A second closure method for Pond 1 will be a multi-media cap consisting of 2-feet of clay, a synthetic membrane, and an internal drainage layer. A 2-foot vegetated soil cover will be placed above the drainage layer and will be sloped away from the pond center.

A 6-foot chain-link fence with a locking gate will be constructed around the Pond 1 disposal site to restrict site access and future mining activity.

O & M activities would include groundwater monitoring and inspection and maintenance of the cap or cover.

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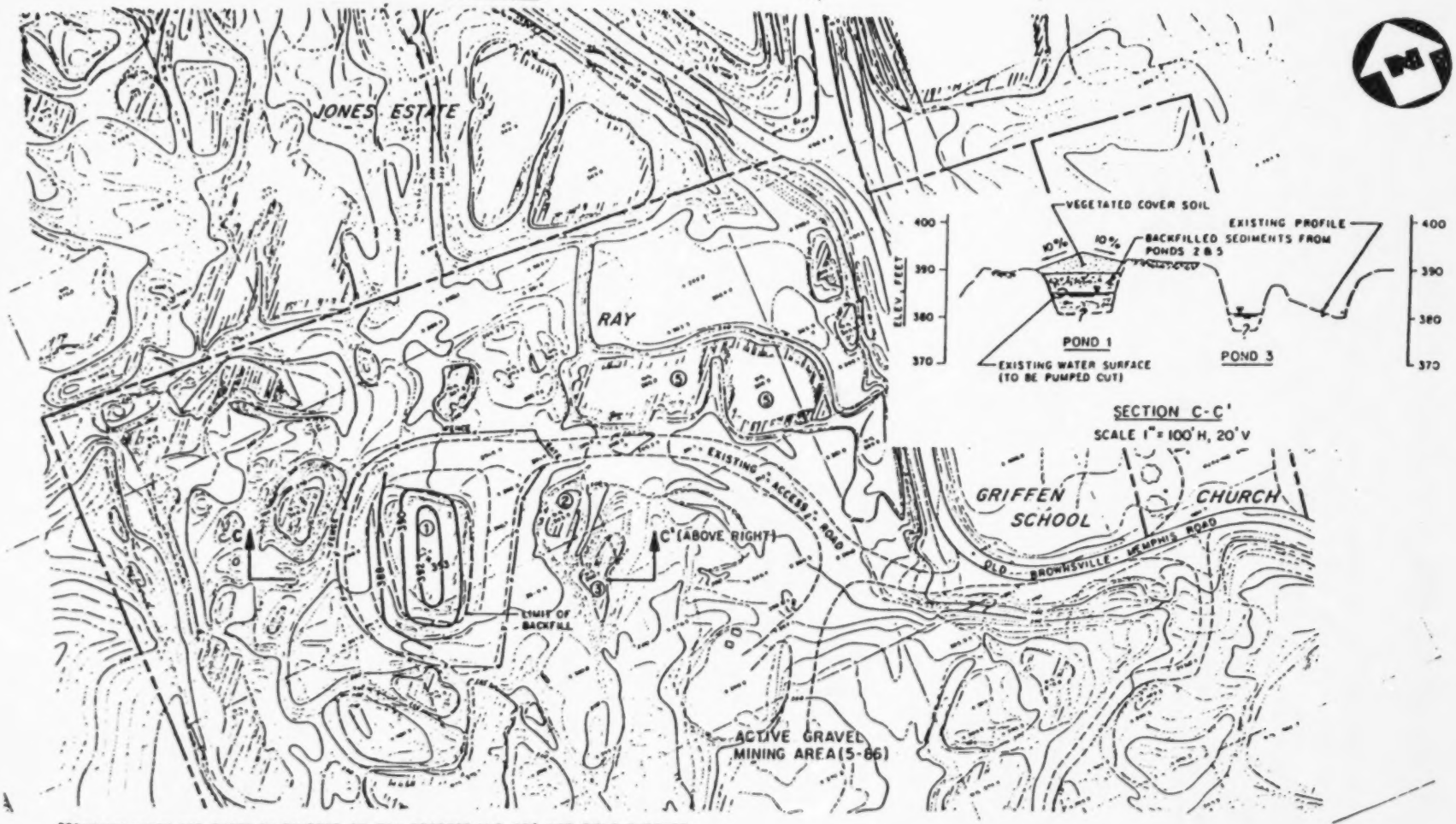

PROPERTY LINES ARE BASED ON FAYETTE CO TAX RECORDS, AND ARE NOT FIELD CHECKED.

FIGURE 5

SEDIMENT DISPOSAL INTO POND No. 1
GALLAWAY PONDS SITE, GALLAWAY, TN

? - The depth of the contaminated sediment is unknown.

ONSITE RCRA LANDFILL

Onsite disposal of contaminated sediments from Ponds 1, 2, and 5 would be performed after the pond water has been removed. The disposal cell would cover an approximated 1.5-acre area. The onsite landfill would consist of a RCRA cap and double liner. The liner and cap both incorporate containment layers of 2 feet of compacted clay. The secondary liner is a 30-mil membrane. The liner system includes leachate collection and detection zones, both of which will be drained to separate storage tanks for leachate holding.

The cap consists of a clay/synthetic combination using a 20-mil membrane. The cap incorporates a gravel/sand drainage layer beneath the final 2-foot soil cover to promote drainage of percolating rainfall (see Figure 6).

The landfill will also include a minimum of four groundwater monitoring wells.

OFFSITE RCRA LANDFILL

After the water is removed from Ponds 1, 2, and 5, the sediments would be excavated from the pond bottoms. It is estimated that an average 2 feet of sediment would be removed from the bottom of each pond. This converts to a total volume of 2,215 cubic yards. The sediment is expected to be interspersed with vegetative matter and bulk solid wastes, such as domestic refuse and possibly metal drums. Clamshell or dragline-type excavating equipment would be appropriate for the pond sediment removal.

After the sediment layer as been removed from each pond, the pond bottom will be sampled at the surface (0-3 inches) and analyzed for HSL pesticides and metals. Analyses would be quick-turnaround (24 hours) to provide vertification of cleanup action levels. Additional sediments would be excavated if contaminant concentrations exceed the designated action levels (see Table 4). Under this alternative, the ponds would not be backfilled, since removal of the sediments and water would effectively eliminate the future potential environmental risks, based on the present site data.

All excavated sediment and bulky wastes would be hauled offsite to a RCRA permitted hazardous waste management facility (HWMF). For costing purposes, the Chemical Waste Management Facility in Emelle, Alabama, has been identified. One-way haul distance is approximately 270 miles. Actual landfill selection would be determined by EPA following a Request for Quotation (RFQ) for hauling and disposal services.

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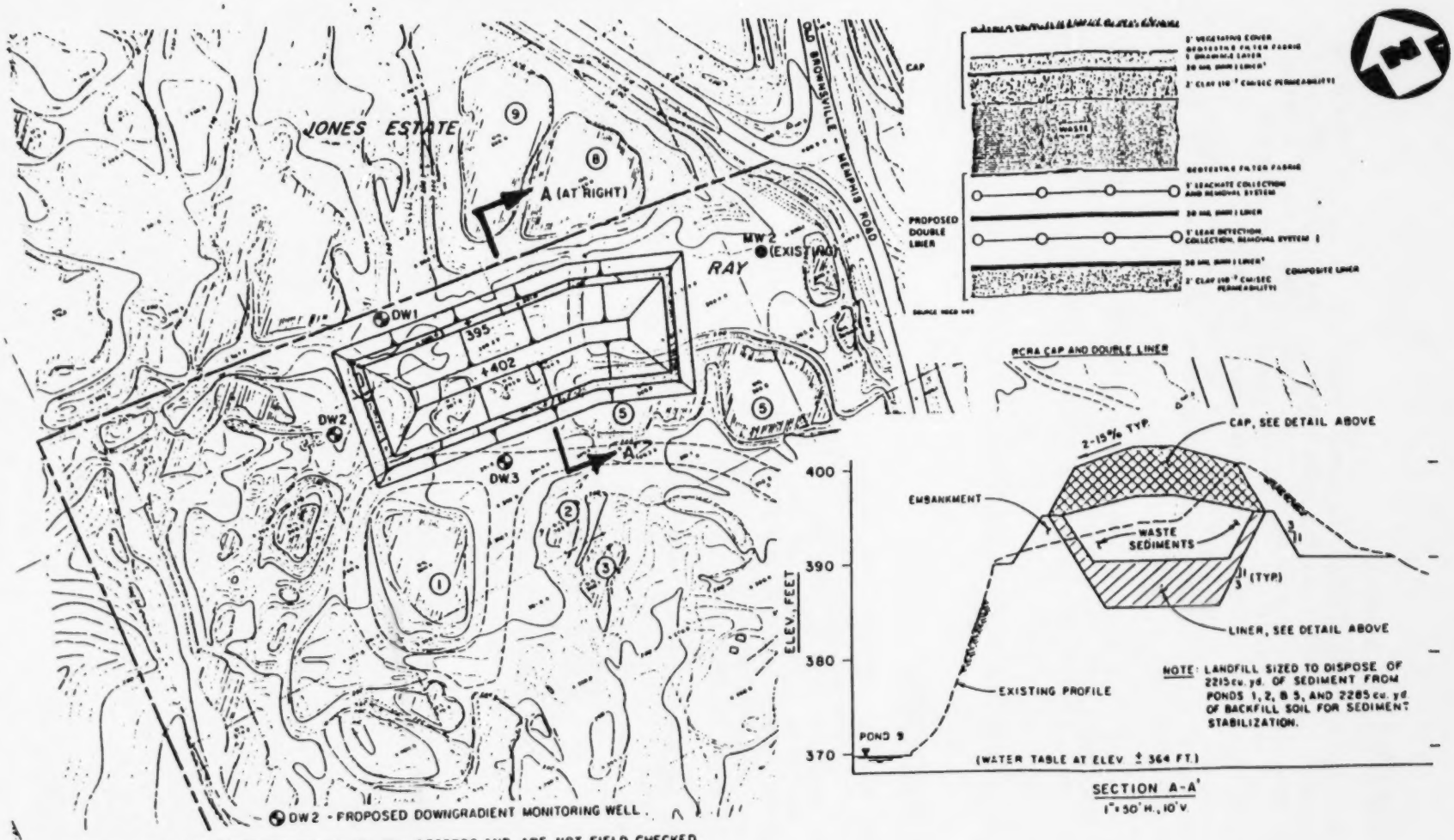

FIGURE 6

ONSITE RCRA LANDFILL
GALLAWAY PONDS SITE, GALLAWAY

COMMUNITY RELATIONS

A public meeting was held on July 21, 1986, to present a summary of the RI/FS process and to explain the proposed remedies for the cleanup of the site. To aid in this presentation, fact sheets were prepared for the meeting. The public comment period officially begun on July 21 and closed on August 12, 1986. Comments received were responded to and are in summary form in the attached Responsiveness Summary.

CONSISTENCY WITH OTHER ENVIRONMENTAL LAWS

The recommended remedial action is applicable, relevant, and appropriate to RCRA clean closure requirements. The site will be closed in accordance with Subtitle C of RCRA. The recommended action includes excavation of contaminated sediment from Ponds 2 and 5 with onsite disposal in Pond 1. This action will be in compliance with RCRA's clean closure requirements. In addition, a groundwater monitoring program which includes quarterly monitoring to establish background concentration levels and thereafter, semi-annually monitoring for the remaining of the post-closure care period may be appropriate.

Discharge of pond water to surface water may require a NPDES permit. The discharge limits will be specified in the permit. Effluent limits are not known until the permit application is reviewed and the state issues the limits.

RECOMMENDED ALTERNATIVE

The appropriate remedial action selected should be protective of human health and the environment, cost effective and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Additionally, the selected alternative should be consistent with the CERCLA compliance policy which requires consideration of RCRA applicable, relevant and appropriate requirements (ARAR's) when remedying and closing sites.

At a minimum, each alternative developed, with the exception of Alternative 1 (No-Action) will provide a comprehensive response that meets the CERCLA goal of protection of the public health and the environment. Additionally, each alternative will include monitoring to evaluate the effectiveness of the remedial action.

The most cost-effective remedy that is applicable, relevant, and appropriate to RCRA requirements involves excavation of contaminated sediments from ponds 2 and 5 with onsite disposal in Pond 1. Pond 1 would be covered with a multi-media (RCRA) cap. The pond water would be diluted with city water to meet AWQC and discharged to a tributary.

The estimated cost to implement this remedy would be $508,000 which includes O & M costs for 30 years.

OPERATION AND MAINTENANCE (O & M)

Operation and maintenance activities will include groundwater monitoring and inspection and maintenance of the cap. Projected O & M costs for for quarterly sampling during the first year are $40,600 (see Table 9). O & M costs are calculated using a present worth analysis calculation. This analysis was based on the Office of Management and Budget - prescribed 10 percent discount rate.

Cost sharing for the project implementation will be 90 percent Federal and 10 percent State. After one-year, all O & M costs will be borne by the State.

SCHEDULE

The Record of Decision will be finalized in September 1986. The Remedial Design should be completed in April 1987. The Remedial Action should be completed in February 1988.

FUTURE ACTIONS

Future actions will include the Office of Regional Counsel obtaining a Consent Order with the site owner to refrain from mining the remediated pond 1 area. This order will also include other institutional controls needed to ensure future land uses compatible with the remedy selected.

After the remedy is implemented, monitoring will be needed to ensure the effectiveness of the action.

TABLE 9

O & M COST SUMMARY -·Pump Ponds 1, 2, 5; Dilute Onsite and Discharge Onsite; Remove Sediments From 2 and 5 and Dispose Onsite in Pond 1 with Multimedia (RCRA) Cap, Gallaway Ponds Site

ITEM	ITEM ($) QUARTERLY SAMPLING
1. Sampling	8,000.00
2. Analysis	30,000.00
3. Maintenance	1,000.00
4. Reporting	1,600.00
TOTAL ANNUAL COST	40,600.00

GALLAWAY PONDS

GALLAWAY, TENNESSEE

DRAFT RESPONSIVENESS SUMMARY

INTRODUCTION

This responsiveness summary documents citizens' reactions and concerns raised in reference to the Remedial Investigation/Feasibility Study (RI/FS) for the Gallaway Ponds site in Gallaway, Tennessee. It also documents for the public record the United States Environmental Protection Agency's response to the questions and comments presented during the public meeting and public comment period.

OVERVIEW

The public meeting was held on July 21, 1986 to discuss the RI/FS and the proposed recommended alternative for the Gallaway Ponds site. The proposed remedial alternative included monitoring for two years after which the contaminated sediments would be centralized in one pond or taken to an offsite RCRA facility. Rather than monitor for 2-years, the Agency has decided to implement the sediment centralization remedy upfront and confirm with 30 years of monitoring. Notification of the meeting was accomplished through news releases and mailings to all interested parties listed in the Community Relations Plan (CRP). The meeting was attended by approximately 13 people including EPA, State officials and the press.

The Agency received no comments from the public during the 3-week public comments period.

BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

The Gallaway Ponds Site was first brought to the attention of the state by several local residents. It appears that while hunting in the vicinity they found sample bottles dumped into one of the ponds on the site. The men also noticed a disagreeable odor and according to a state official, could see where liquid wastes had been allowed to run into the pond. The concerned citizens alerted the Fayette County Environmental Officer who in turn contacted the State the first week of January 1982. Around the end of January, the State assigned one of its representatives to meet with the men at the site in an effort to determine the extent of the problem.

Residential wells were tested because of the concern over contamination of the shallow aquifer. No contamination was found.

When the site was first discovered in 1982, media interest was high. However, little media interest is shown at the present time. Local residents have shown minimal interest since the site's discovery.

SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC MEETING AND THE EPA RESPONSES

1.0 How often would the groundwater be monitored?

EPA Response: Quarterly for a period of one year. After the first year, monitoring will be performed semi-annually for 30 years.

2.0 What were the levels of contaminants found during the Emergency Response.

EPA Response: Table 6-3 of the Focused Remedial Investigation Report was referenced.

3.0 Who owns the land?

EPA Response: Mr. Billy Ray is the current owner.

4.0 Are there any existing wells onsite? Did you look for any old wells?

EPA Response: Only one existing well was identifed during the RI. The site owner drilled a drinki g water well which penetrated the Jackson Clay.